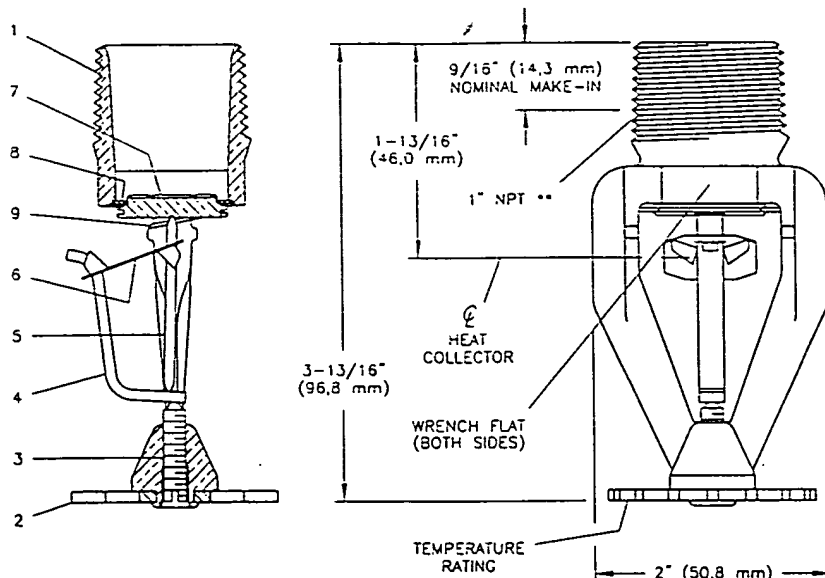
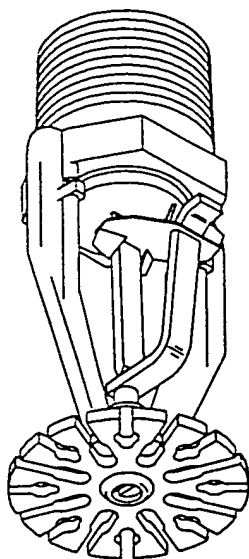




# **EARLY SUPPRESSION FAST RESPONSE SPRINKLERS (FM) & SPECIFIC APPLICATION ESFR SPRINKLERS (UL & C-UL) MODEL ESFR-25™ PENDENT, 25.2 K-FACTOR, 1 INCH NPT\*\***



## **GENERAL DESCRIPTION**

The 25.2 K-Factor, Model ESFR-25™ Pendent Sprinklers (Ref. Figure A) are Listed and Approved by Factory Mutual Research Corporation (FM) as "Early Suppression Fast Response Pendent Sprinklers" designed for use with wet pipe, automatic sprinkler systems for the fire protection of high-piled storage. They are suppression mode sprinklers, and their use is especially advantageous as a means of eliminating the use of in-rack sprinklers. Storage arrangements which can be protected by the ESFR-25 under the FM Design Criteria include open-frame single-row, double-row, multiple-row, and portable rack storage, as well as palletized and solid-piled storage, of most encapsulated or non-encapsulated, common materials including cartoned unexpanded plastics. In addition, the protection of some storage arrangements of roll paper and rubber tires can be considered as well.

The 25.2 K-Factor, Model ESFR-25 Pendent Sprinklers are also Listed by Underwriters Laboratories Inc. (UL) and by UL for use in Canada (C-UL) as "Specific Application Early Suppression Fast Suppression Sprinklers" for

1-Frame  
2-Deflector  
3-Compression Screw

4-Hook  
5-Strut  
6-Link Assembly

7-Button  
8-Gasketed Spring Plate  
9-Ejection Spring

\*\* Pipe thread connections per ISO 7/1 can be provided on special request.

**FIGURE A  
25.2 K-FACTOR, MODEL ESFR-25 PENDENT SPRINKLER ASSEMBLY**

use in the protection of open-frame single-row, double-row, multiple-row, and portable rack storage, as well as palletized and solid-piled storage, of most encapsulated or non-encapsulated, common materials including cartoned unexpanded plastics as indicated under the UL and C-UL Design Criteria. These reduced design pressures are not for use with roll paper or rubber tire storage.

The ESFR-25 has a nominal K-factor of 25 and is designed for use with storage heights of up to a 40 ft. (12.2 m) and ceiling heights of up to 45 ft. (13.7 m). It provides the system designer with hydraulic and sprinkler placement options not presently available to the traditional ESFR sprinklers having a nominal K-Factor of 14.

In particular, the ESFR-25 has been designed to operate at substantially lower end head pressures, as compared to ESFR sprinklers having a

nominal K-Factor of 14. This feature offers flexibility when sizing the system piping, as well as possibly reducing or eliminating the need for a system fire pump. Also, the ESFR-25 permits use of a maximum deflector-to ceiling distance of 18 inches (460 mm) versus 14 inches (360 mm); and, a storage arrangement of up to 40 ft. (12.2 m) with a ceiling height of up to 45 ft. (13.7 m) does not require in-rack sprinklers as does ESFR sprinklers having a nominal K-Factor of 14.

The ESFR-25, similar to the ESFR-1, described in Technical Data Sheet TD598, has a unique patented frame design which substantially reduces the frame shadow effects that normally tend to produce non-uniformity in the spray pattern. This feature, in combination with a time proven fusible link mechanism design and the nominal K-factor of 25 provides the ESFR-25 with the very latest in sprinkler technology.

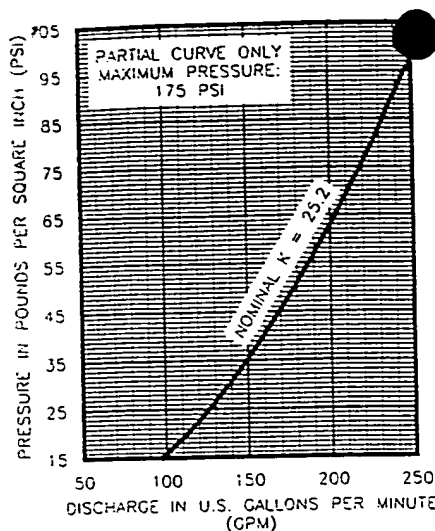


FIGURE B  
NOMINAL DISCHARGE CURVES

## APPROVALS AND STANDARDS

The Model ESFR-25 Sprinklers are Listed and Approved by Factory Mutual Research Corporation as "Early Suppression Fast Response Sprinklers". Refer to the FM Design Criteria section for installation criteria that pertains to the FM listing and approval of the ESFR-25.

The Model ESFR-25 Sprinklers are Listed by Underwriters Laboratories Inc. (UL) and Underwriters Laboratories Inc. for use in Canada (C-UL) as "Specific Application Early Suppression Fast Response Sprinklers". Refer to the UL and C-UL Design Criteria section for installation criteria that pertains to the UL and C-UL listing of the ESFR-25.

### WARNING

*The Model ESFR-25 Sprinklers described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction (e.g., Factory Mutual Research Corporation). Failure to do so may impair the integrity of these devices.*

*The owner is responsible for maintaining their fire protection system and devices in proper operating condition. The installing contractor or manufacturer should be contacted relative to any questions.*

## TECHNICAL DATA

The Model ESFR-25 Pendent Sprinklers are rated for use at a maximum service pressure of 175 psi (12.1 bar). They are available in 165°F/74°C and 214°F/101°C temperature ratings with a natural brass finish.

The nominal discharge curve plotted in Figure B represents the flow "Q" in GPM (LPM) as determined by the formula:

$$Q = K\sqrt{p}$$

where the nominal sprinkler discharge coefficient "K" = 25.2 (362.9); and "p" equals the residual flowing pressure in psi (bar).

The sprinkler Frame is die cast brass; the Strut and Hook are Monel; the Deflector and Compression Screw are phosphor bronze; and, the Button is commercial bronze. The two halves of the Link Assembly are nickel and the Ejection Spring is Inconel wire. The Gasketed Spring Plate consists of a beryllium nickel disc spring that is sealed on both its inside and outside edges with a Teflon<sup>®</sup> gasket.

The Link Assembly has a thin, black resin type coating which will protect the Link Assembly from deterioration which could otherwise be caused by normal atmospheres. The coating is not intended to provide protection against attack by corrosive media.

## FM DESIGN CRITERIA

The Model ESFR-25 Sprinklers are FM Listed and Approved as "Early Suppression Fast Response Sprinklers" for installation in accordance with the following criteria. Applications for the ESFR-25 Sprinklers may be expanded in the future as additional fire test data becomes available.

The protection of encapsulated and non-encapsulated, Class I, II, III, and IV, as well as cartoned unexpanded plastics is as follows:

1. The system is to be designed to supply the most hydraulically demanding 12 sprinklers, assuming 4 sprinklers on each of 3 adjacent branch lines.

2. The design pressures are to be based on maximum storage and ceiling heights as follows:

Maximum Storage Height, Ft. (m)	Maximum Ceiling Height, Ft. (m)	Minimum Flowing Pressure, psi (bar)
40 (12.2)	45 (13.7)	50 (3.4)
35 (10.7)	40 (12.2)	40 (2.7)
30 (9.1)	35 (10.7)	30 (2.1)
25 (7.6)	30 (9.1)	20 (1.4)

3. The sprinkler system is to be wet pipe only (dry or preaction systems are not permitted).

4. Storage arrangements include open-frame single-row, double-row, multiple-row, and portable rack storage, as well as palletized and solid-piled storage.

5. Sprinkler spacing is to provide a maximum coverage area of 100 ft<sup>2</sup> (9.3 m<sup>2</sup>) and a minimum coverage area of 80 ft<sup>2</sup> (7.4 m<sup>2</sup>). The maximum distance between sprinklers on a branch line is to be 10 ft. (3.1 m) for ceilings higher than 30 ft. (9.1 m), and a maximum of 12 ft. (3.7 m) for ceiling heights up to 30 ft. (9.1 m). The minimum distance between sprinklers to prevent cold soldering is 8 ft. (2.4 m).

6. Sprinklers are to be positioned so that deflectors are located a maximum distance of 18 inches (460 mm) and a minimum of 4 inches (100 mm) below the ceiling.

7. The hose stream demand is to be a minimum of 250 GPM (950 LPM).

8. The water supply duration is to be a minimum of 1 hour.

9. All other system installation details (e.g., obstructions that prevent

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sprinkler discharge from reach the hazard) are to be the same as K14 ESFR sprinklers as recommended in FM Loss Prevention Data Sheet 2-2 "Installation Guidelines for Early Suppression Fast Response Sprinklers".

In addition, the ESFR-25 Sprinklers may be used for the protection of rubber tire storage and roll paper storage as follows:

1. ESFR-25 Sprinklers may be used to protect on-side and on-tread (not interlaced) storage of rubber tires in open frame racks to a maximum height of 25 feet (7,6 m) under ceilings no higher than 30 feet (9,1 m). The sprinkler system must be designed to supply 12 sprinklers at 20 psi (1,4 bar), flowing 4 sprinklers per branch line on 3 branch lines. Sprinklers must be rated 165°/74°C. Follow all other guidelines of FM Loss Prevention Data Sheet 2-2, accept that the hose stream demand is to be 500 GPM (1900 LPM) and the water supply duration is to be a minimum of 2 hours.
2. ESFR-25 Sprinklers may be used to protect heavy and medium weight paper storage as indicated in the following table. These guidelines are applicable to banded or unbanded rolls in open, standard, or closed array. The design is to include a hose stream allowance of 250 GPM (950 LPM) and the water supply duration is to be a minimum of 1 hour.

Maximum Storage Height, Ft. (m)	Maximum Ceiling Height, Ft. (m)	Minimum Flowing Pressure, psi (bar)
<b>Heavy Weight</b>		
25 (7,6)	30 (9,1)	20 (1,4)
30 (9,1)	40 (12,2)	40 (2,7)
<b>Plastic Coated Heavy Weight</b>		
20 (6,1)	30 (9,1)	20 (1,4)
20 (6,1)	40 (12,2)	20 (1,4)
<b>Medium Weight</b>		
20 (6,1)	30 (9,1)	20 (1,4)
20 (6,1)	40 (12,2)	40 (2,7)

## UL & C-UL DESIGN CRITERIA

The Model ESFR-25 Sprinklers are UL and C-UL Listed as "Specific Application Early Suppression Fast Response Sprinklers" for use in accordance with NFPA 13, 231, and 231C to protect single-, double-, and multiple row rack storage (no open top containers or solid shelves) and palletized and solid pile storage (no open containers or solid shelves) of Class I, II, III, and IV commodities encapsulated or unencapsulated and cartoned Group A unexpanded plastics when installed in the following ceiling and storage heights and minimum design pressures:

Maximum Storage Height, Ft. (m)	Maximum Ceiling Height, Ft. (m)	Minimum Flowing Pressure, psi (bar)
40 (12,2)	45 (13,7)	40 (2,7)
35 (10,7)	40 (12,2)	25 (1,7)
30 (9,1)	35 (10,7)	20 (1,4)
25 (7,6)	30 (9,1)	15 (1,0)

### NOTE

*The above noted pressures are not for use with roll paper or rubber tire storage.*

The Model ESFR-25 Sprinklers should be installed using the same installation obstruction and construction criteria as is applicable to Early Suppression Fast Response Sprinklers per NFPA 13, 231, and 231C except that the sprinklers may be installed up to 18 inches (460 mm) below the ceiling.

## CARE AND MAINTENANCE

Automatic sprinklers must never be shipped or stored where their temperatures will exceed 100°F/38°C and they must never be painted, plated, coated, or otherwise altered after leaving the factory. Modified or over-heated sprinklers must be replaced.

Care must be exercised to avoid damage to the sprinklers - both before and after installation. Sprinklers damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced.

### NOTE

*Before closing a fire protection system main control valve for maintenance work on the fire protection system which it controls, permission to shut down the affected fire protection system must be obtained from the proper authorities and all personnel who may be affected by this action must be notified.*

It is recommended that automatic sprinkler systems be inspected quarterly by a qualified Inspection Service.

## WARRANTY

Seller warrants for a period of one year from the date of shipment (warranty period) that the products furnished hereunder will be free from defects in material and workmanship.

*For further details on Warranty, see Price List.*

## INSTALLATION

The Model ESFR-25 Pendent Sprinklers must only be installed in the pendent position. With pipe thread sealant applied to the pipe threads, an adjustable Crescent type wrench may be used for installation of the ESFR-25 by applying the wrench to the sprinkler wrench flats only.

## ORDERING PROCEDURE

Contact your local distributor for availability.

### Sprinkler Assemblies:

Specify: (specify temperature rating), natural brass, Model ESFR-25 Pendent Sprinkler, PSN (specify).

165°F/74°C ..... PSN 58-441-1-165  
214°F/101°C ..... PSN 58-441-1-214

### "Special Order"

#### Sprinkler Assemblies with ISO 7/1 Thread Connections:

Specify: (specify temperature rating), natural brass, Model ESFR-25 Pendent Sprinkler with thread connection per ISO 7/1, PSN (specify).

165°F/74°C ..... PSN 58-442-1-165  
214°F/101°C ..... PSN 58-442-1-214

## PATENTS

U.S.A. Patent Number 4,580,729 is applicable to the Model ESFR-25. A patent is pending with regard to other design features.

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